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Material and Geometric Effects in 3D Transmon Qubits MATTHEW WARE, M.P. DEFEO, J.D. STRAND, B. XIAO, B.L.T. PLOURDE, Syracuse University, STEFANO POLETTO, CHAD RIGETTI, IBM Research, SYRACUSE UNIVERSITY COLLABORATION, IBM RESEARCH COLLABORATION — Optimization of coherent behavior is a key ingredient for any scalable architecture using qubits. Recent breakthroughs in novel qubit designs have resulted in significant improvements in coherence by coupling superconducting qubits to 3-dimensional microwave cavities. We are investigating material and geometric factors affecting the coherence of these 3D transmon qubits. Various loss mechanisms limiting the qubit coherence will be discussed. The role played by device geometry and size in determining the effective qubit-cavity coupling will also be explored.

Matthew Ware
Syracuse University

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